

CLAIMS

We Claim:

1. A method comprising:

fabricating a die having imaging circuitry;

fabricating a lid having a transparent region and support regions, the support regions having a predetermined height, the fabrication of the lid comprising:

applying a photo-sensitive adhesive layer to a transparent plate; and

patterning the photo-sensitive adhesive layer to form the transparent region and the support regions; and

mounting the lid directly onto the die so that transparent region generally cover the imaging circuitry on the die but is separated from the imaging circuitry on the die by a gap having a dimension substantially equal to the predetermined height of the support regions of the lid.

2. The method of claim 1, wherein the patterning of the photo-sensitive adhesive layer is performed using photo-lithography.

3. The method of claim 1, further comprising the fabrication of a plurality of the lids by patterning the photo-sensitive adhesive layer applied to the transparent plate to form a plurality of transparent regions and corresponding support regions on the transparent plate.

4. The method of claim 1, further comprising scribing the patterned transparent plate to singulate the lids.
5. The method of claim 1, further comprising encapsulating the die with the lid mounted thereon into a package.
6. The method of claim 5, wherein the package is a Tape Automated Bond (TAB) package.
7. The method of claim 5, wherein the encapsulation further comprises:

electrically coupling one or more leads to one or more contact bumps on the die;

and

providing insulation around the leads.
8. The method of claim 5, wherein the encapsulation further comprises encapsulating the package in a packaging material.
9. The method of claim 7, further comprising electrically coupling one or more solder balls to the one or more leads respectively.
10. The method of claim 9, wherein the electrically coupling the one or more solder balls to the one or more leads further comprises forming electrically conductive vias in a packaging material formed between the leads and the solder balls respectively.
11. An apparatus comprising:

a die, the die having imaging circuitry formed thereon;

a lid mounted directly onto the die, the lid having a transparent region positioned above the imaging circuitry on the die and support regions for supporting the transparent region above the imaging circuitry, the support regions having a predetermined height which defines a gap between the imaging circuitry and the transparent region of the lid.

12. The apparatus of claim 11, wherein the height of the support regions range from 0.1 to 50 microns.
13. The apparatus of claim 11, wherein the lid is fabricated from a transparent plate that is patterned with a photo-sensitive adhesive to form the support regions.
14. The apparatus of claim 11, wherein the transparent region of the lid has a thickness ranging from 0.3 to 0.7 millimeters.
15. The apparatus of claim 13, wherein the photosensitive adhesive is one of the following types of adhesives: BCB or AFP.
16. The apparatus of claim 13, wherein the transparent plate is glass.
17. The apparatus of claim 11, wherein the die and lid are encapsulated in a package.
18. The apparatus of claim 17, wherein the package is a Tape Automated Bond package.
19. The apparatus of claim 18, wherein the package includes a packaging material surrounding the die.
20. The apparatus of claim 11, wherein the thickness of the die is 0.7 millimeters or less.

21. The apparatus of claim 11, wherein the thickness of the die is 0.2 millimeters or less.
22. The apparatus of claim 11, wherein the package comprises a plurality of leads electrically coupled to the die.
23. The apparatus of claim 22, wherein the leads are at least partially covered by an insulator.
24. The apparatus of claim 23, wherein the insulator is polyimide.
25. The apparatus of claim 22, further comprising a plurality of solder balls electrically coupled to the plurality of leads respectively.
26. The apparatus of claim 25, wherein the plurality of solder balls are electrically coupled to the plurality of leads through electrically conductive vias formed in a packaging material provided between the leads and the solder balls respectively.